Citation:

Williams PG, Grafenauer SJ, O'Shea JE. Cereal grains, legumes, and weight management: a comprehensive review of the scientific evidence. *Nutr Rev.* 2008 Apr;66(4):171-82.

PubMed ID: 18366531

Study Design:

Systematic Review

Class:

M - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To assess the evidence about the role of grains and legumes in the prevention and management of overweight and obesity, to ensure health messages are evidence-based and consistent with the best research available.

Inclusion Criteria:

- Published in English
- Human studies
- Anthropometric outcome measures reported

Exclusion Criteria:

- Original data not reported
- Only intermediate markers examined rather than direct measures of overweight and obesity
- Studies with a low quality rating, using methods and criteria of the European Heart Network, generally because they lacked control groups or the methods were inadequately described or validated

Description of Study Protocol:

Recruitment

Literature search:

- Databases searched: PubMed, Medline, Scopus, Cinhal, Science Direct
- Dates included: 1980 - 2005
- Search terms: cereal, grain, wholegrain, legume, pulse, bread, pasta, rice, wheat, barley, oat, rye, soy, bean, pea in conjunction with obesity, overweight, satiety, BMI, waist

- References in identified papers also examined
- Relevant studies assessed for scientific quality using the methods and criteria described by the European Heart Network

Design: Comprehensive, systematic review

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis: not completed

Data Collection Summary:

Timing of Measurements: not applicable

Dependent Variables

- Body mass index (BMI)
- Weight
- Waist circumference (WC)
- Waist-hip ratio (WHR)

Independent Variables

- Grain intake - as part of a dietary pattern or individual grain foods, including whole grain versus refined grains
- Legume intake

Control Variables

Description of Actual Data Sample:

Initial N:

- Number of abstracts identified for review: N = 556
- Number directly relevant to topic: N = 121

Attrition (final N): Number of eligible studies after exclusion: N = 53

Age: not mentioned

Ethnicity: not mentioned

Other relevant demographics

Anthropometrics

Location: Authors - Australia

Summary of Results:

Key Findings

- There is good evidence from epidemiological and intervention studies that
  - a diet high in whole grains is associated with lower BMI;
  - a diet high in whole grains and legumes can help reduce weight gain; and
  - significant weight loss is achievable with energy-controlled diets that are high in cereals and legumes
- There is weak evidence that high intakes of refined grains may cause small increases in WC in women.
- There is no evidence that low-carbohydrate diets that restrict cereal intake offer long-term advantages for sustained weight loss.
- There is insufficient evidence to make clear conclusions about the protective effect of legumes on weight.

Epidemiological studies

Studies that analyzed dietary patterns (using principal components analysis or cluster analysis)

- Most studies found an association between a prudent dietary pattern with higher levels of cereals and legumes with lower measures of overweight, supporting recommendations to include these foods in a healthy diet
  - studies do not provide a clear consensus on
    - role of bread specifically
    - differing aspects of whole-grain versus refined cereals
    - dose-response data about the relationship
  - 11 studies identified
    - 10 studies found patterns that included higher intakes of whole grains to be associated with lower measures of obesity.
      - studies included both male and female subjects, age ranges = 8 to 87 years, in 12 different countries
    - one study found no association between BMI and quintiles of conformance to prudent diet with high intake of whole grains and legumes (Health Professionals Follow-up Study)

Cross-sectional studies

- Studies are consistent overall in demonstrating that higher intakes of whole-grain cereals and legumes are associated with lower BMI, WC and risk of overweight.
  - 1 major study showed a slight higher WHR (But not BMI) with higher consumption of refined grains
  - 3 other studies did not support that finding

Longitudinal studies of weight change

- Overall, results of longitudinal studies of weight change are somewhat inconsistent
  - Most studies have found an inverse relationship between whole-grain intake and weight gain
  - There is limited evidence in relation to legume intake.
  - A few studies found that higher intakes of refined grains appeared to be associated with increases in WC and BMI in women (weight changes < 0.7 kg over a 12 year period, statistically significant)
  - No studies were found that examined the association of high and low glycemic index grain consumption with body weight

Intervention studies

- There are few well-controlled studies that have specifically examined the effect of higher intakes of cereals and legumes on weight reduction or maintenance in the long-term, or compared the effects of refined- and whole-grain cereals specifically.
- Studies provide consistent evidence that weight loss is still achievable in diets that are high in cereals, especially the whole-grain variety
    - 17 intervention studies identified
        - 11 directly reported changes in weight or WC
            - Only a few (~4) studies reported a better rate of weight loss when the grain intake of the diet was increased.
            - All other studies demonstrated that a diet with high cereal content can support weight control, although most did not find a superior rate of weight loss when compared to diets with lower cereal intake levels.

Other Findings

Low carbohydrate diets

- 6 studies since 2003 have compared conventional and low-carbohydrate diets; duration = 3 to 12 months
    - over 6 months, slightly better weight loss (differences of 3.8 - 5.8 kg) reported with low-carbohydrate diet
    - after twelve months, the difference lost significance in those studies that followed participants longer

Author Conclusion:

This research provides strong support for continuing messages to the public that a diet high in whole-grain cereals and legumes will support good overall health and is likely to help maintain a healthy body weight.

Reviewer Comments:

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search termsused described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	Yes
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issued considered? If data from studies were aggregated for meta-analysis, was the procedure described?	Yes
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes